REMARKS/ARGUMENTS

Reconsideration is respectfully requested.

Claims 1-28 are pending in the present application before this amendment. By the present amendment, Claims 4, 13, 20, and 25 have been canceled without prejudice, and Claims 1, 5, 7, 9, 10-12, 17-19, 21, and 23-24 have been amended. No new matter has been added.

Claims 1-28 stand objected to for containing informalities. Claims 4, 13, 20, and 25 stand rejected under 35 U.S.C. § 112, ¶2, as being indefinite.

In response, all suggested amendments to Claims 1, 5, 7, 9, 10-12, 17-19, 21, and 23-24 have been made, and Claims 4, 13, 20, and 25 have been cancelled without prejudice. Withdrawal of the objection and rejection is respectfully requested.

Claim 1 stands rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,295,013 (Ono) in view of U.S. Patent No. 4,559,499 (Bursztejn). The "et al." suffix, which may appear after a reference name, is omitted in this paper.

As to Claim 1, Applicant respectfully submits that the Item 7 of the Office Action (page 5 bottom to page 7) is based on misunderstanding of the teachings of the cited Ono reference. It is respectfully asserted that the subject matter taught and disclosed in Ono—whether it is considered individually or in combination with Bursztejn—does not teach or suggest to the claimed subject matter of Claim 1 for the reasons below and in view of the attached EXHIBITS I and II.

The optical receiver in Figure 1 of the cited Ono reference works as follows:

The FSK signal light 102 is supplied to a polarization controller 21 for polarization

control. The output of the polarization controller 21 is supplied to a PM fiber 22 to introduce a propagation delay-time difference between two intrinsic optical axes that are set to be orthogonal to each other. The output of the PM fiber 22 is then supplied to a polarization divider 23, **which is structured to have an optical axis having forty-five degrees to the two intrinsic optical axes of the output of the PM fiber 22, thereby dividing the signal light into two lights having orthogonal polarizations** that are subsequently supplied to two optical detectors 24, 25, respectively. The detected outputs of the optical detectors 24, 25 are provided to a differential amplifier 26, **from which the FSK demodulated output signal 201 is obtained**. The optical detectors 24, 25 and the differential amplifier 26 are arranged to form components of a basic balanced receiver (see enclosed Exhibit 1, which describes a known balanced receiver).

The object of the cited Ono reference is to ensure that the detection efficiency of an optical receiver is stable at any time. To this end, the demodulated output signal 201 of the differential amplifier 26 is supplied to a peak detector 27, which outputs an electric signal 202 having a level corresponding to an amplitude of the demodulated output signal 201 to a controller 28. The controller 28 compares a level of the electric signal 202 with a reference value corresponding to a suitable amplitude for the demodulated output signal 201, and generates a control voltage 203 in accordance with the comparison result **for increasing the electric signal 202 to a maximum. The control voltage 203 is supplied to the polarization controller 21, which controls polarization of the FSK signal light 201.** The result of polarization control

is equivalent to controlling the phase difference between the two intrinsic optical axes of the PM fiber 22 so that the center frequency of the frequency discrimination characteristics of the optical receiver is shifted along the frequency axis. Hence, demodulation can be carried out stably for a long time even if the ambient temperature varies.

In the present application, the invention of claim 1 is directed to a phase demodulator for measuring a phase difference between test and reference signals that have fixed carrier frequencies. The phase demodulator includes an amplitude control device for adjusting amplitudes of the test and reference signals to satisfy a predetermined condition, a differential amplifier for generating an amplitude-modulated output from the amplitude-adjusted test and reference signals, and a signal processing device including an amplitude demodulator for demodulating the amplitude-modulated output to obtain an output that is related to the phase difference between the test and reference signals.

In the office action, the Examiner considered the two lights from the polarization divider 23 to be the test and reference signals, respectively. It is noted that while the two lights are actually divided from the same source, i.e., the output of the PM fiber 22, **they are predetermined to have orthogonal polarizations, as best shown in Figure 3. Moreover, there is no amplitude control device in Figure 1 of the cited Ono reference in view of the polarization divider with the forty-five degree optical axis.** Please refer to the enclosed Exhibit 2, which contains a comparison made by the inventor between the phase demodulator of Claim 1 and the

optical receiver of the cited Ono reference. According to the inventor, due to the inclusion of the polarization divider with the forty-five degree optical axis in the optical receiver of the cited Ono reference, when the FSK signal light is demodulated properly, the DC terms of the output signals from the optical detectors 24, 25 are offset by the differential amplifier 26 automatically, **and the AC terms of the output signals from the optical detectors 24, 25 are already equal in amplitude**. Hence, the conclusion that Claim 1 of the invention is rendered obvious by the teachings of the cited Ono and Bursztein references (considered individually or in combination) is respectfully submitted to be totally **not** correct.

In addition, the output of the differential amplifier 26 is not an amplified phase difference and is actually the information contained in the FSK signal light 102, and the purpose of the differential amplifier 26 is not to control the phase difference between the test and reference signals as alleged by the Examiner. Furthermore, the amplitude demodulator in this invention generates an output that is related to the phase difference, **which is actually a time-varying value in practice**, between the test and reference signals, whereas the peak detector 27 is used to output **a peak value** such that the controller 28 is able to control the polarization controller 21 for shifting the center frequency of the frequency discrimination characteristics of the optical receiver along the frequency axis whenever appropriate. The function and effect attributed to the amplitude demodulator in this invention and the peak detector in the cited Ono reference are entirely different from each other.

While Figure 6 of the cited Ono reference shows a phase shift keying (PSK) optical transmission system, the elements 51, 53, 54, 56, 57, 58 used therein are the same as the elements 21, 23, 24, 25, 26, 27, 28 found in the FSK embodiment of Figure 1 of the same Ono reference. Hence, most of the arguments made in the preceding item are also applicable to Figure 6 of the cited Ono reference and are therefore reasserted.

Claims 7, 9, and 21 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,018,391 (Yoshida) in view of Ono.

In item 8 of the Office Action (page 7, bottom to page 9, top), the Examiner states that Figure 4 of the cited Yoshida reference allegedly discloses a phase difference detector 14 that includes an amplifier 13 for generating an amplitude-modulated output. Reference is made to column 5, lines 54 to 59 of the cited Yoshida reference, where it is mentioned that:

> *"An amplifier 13 and a phase shifter 14 are used to adjust the amplitude and the phase of the beat signal so that an output level from a parameter extractor 16 is zero when a microscopic foreign matter is absent or so that the beat signal is equal to the modulation signal (or reference signal) which drives the frequency shifter 4."*

In the same Item 8 of the Office Action, the Examiner admits to the fact that the cited Yoshida reference fails to disclose a phase difference detector that includes a differential amplifier and a signal processing device including an amplitude demodulator. The Examiner then relies on the combination of the cited Yoshida and Ono references to reject Claims 7, 9 and 21.

However, as explained above, the functions of the differential amplifier and

amplitude demodulator in the claimed invention are entirely different from those of the differential amplifier and peak detector in the cited Ono reference. Moreover, the differential amplifier and the peak detector of the cited Ono reference, as understood, can be used to replace the amplifier and phase shifter of the cited Yoshida reference **for adjusting the amplitude and the phase of the beat signal**. Therefore, the Examiner's rejection of claims 7, 9 and 21 is evidently based on hindsight and is respectfully asserted to be based on incorrect and erroneous conclusions drawn from the cited references.

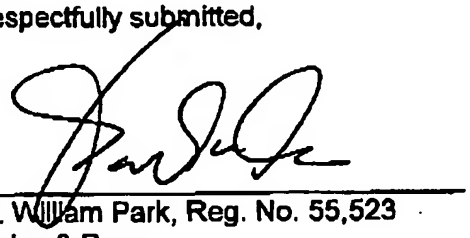
For the reasons above, Applicant respectfully requests withdrawal of the claim rejections and an indication of allowable subject matter.

Claims 2-3, 5-6, 8, 10-12, 14-19, 22-24, and 26-28 are indicated as being allowable if they are rewritten in independent form to incorporate all limitations of the base claim and any intervening claims.

For the reasons set forth above, Applicant respectfully submits that Claims 1-3, 5-12, 14-19, 21-24, and 26-28, now pending in this application, either have already been indicated as being allowable or are in condition for allowance. This amendment is considered to be responsive to all points raised in the Office Action. Accordingly, Applicant respectfully requests a Notice of Allowance in the next action.

Should the Examiner have any remaining questions or concerns, the Examiner is encouraged to contact the undersigned attorney by telephone to expeditiously resolve such concerns.

Respectfully submitted,



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